

the Citrus Industry

MAY 12 1950

THE CITRUS PICTURE

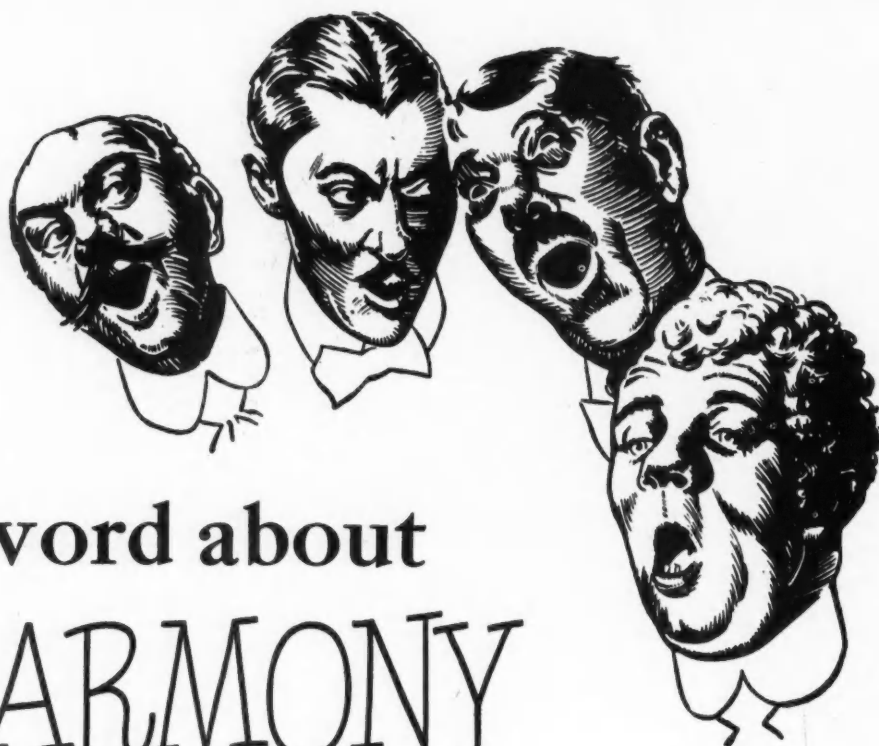
While the prices of both oranges and grapefruit have declined from the early season high level, growers are still receiving a very substantial profit for their fruit. It was not to be expected that the high prices commanded by Florida fruit during the early part of the season could last indefinitely. One pleasing feature of the present auction market is that Florida oranges are not only holding their own with California offerings, but are in many instances outselling the Pacific coast fruit. Grapefruit, too, is holding up well, with prices far above the red ink level. It is believed that the returns to growers will be the highest on record.

One disappointing feature is the failure of much grapefruit and a considerable quantity of Valencias to meet the maturity test, although in some cases the seed is already sprouting in grapefruit and Valencias are beginning to turn green.

Exceedingly dry weather during April in most of the citrus belt has brought out the irrigation systems wherever available. For the most part, satisfactory bloom is reported, although a few sections report that the later bloom is somewhat spotted.

All in all, Florida citrus growers have experienced a satisfactory season with profits in highly gratifying contrast to the losses experienced in several recent years. Most growers feel confident that they may look forward with confidence to the near future and are doing their best to insure a crop of quality fruit by intelligent grove practices.

J. FRANCIS COOPER, EDITOR
AGRI. EXPERIMENT STATION



a word about HARMONY

It makes little difference whether you're selling to canneries or to packing houses for fresh fruit shipment—the fruit that pays off best is the fruit that's best in terms of quality.

To get quality you have to keep your fertilizing and insect control in the proper balance with the requirements of your particular grove soil.

And the best way to do that is to call in your local Wilson & Toomer

Representative. He represents a firm whose products have been favorites in Florida for well over half a century. He lives in your community, knows local problems and he's backed by the extensive resources, technical know-how and spirit of service of his company. He'll be glad to advise you how to keep your entire grove care operation in tune with another profitable season!



WILSON & TOOMER
FERTILIZER COMPANY

JACKSONVILLE, FLORIDA

Citrus Insects . . .

For May, 1950

The frequent cool days and nights which have continued throughout April, have resulted in some retardation of insect and mite development. However, they are present in considerable numbers in some groves and sprays will be required in many instances.

Scale Insects

Most growers who desired to apply sprays for scale control in the spring of 1950 did so during April. However, in a few instances it may be advisable to apply sprays during May. Growers should be cautioned in this instance since May sprays are usually too early in the season to give good scale control throughout the rest of the summer and fall months. Where possible, it is desirable that sprays for scale control be delayed until sometime in June. However, for those wishing to apply sprays in May, large numbers of immature purple and red scales will be present during the first half of the month. Sprays for scale control during May should be planned only where emergency conditions exist. Under no circumstances is it recommended that sprays be applied during May to replace the summer scale applications. These sprays should certainly be withheld until June or July.

Where oil is to be used in May, fruit size must be considered. Oil sprays should not be applied during the period when fruit is between $\frac{3}{4}$ inch and $1\frac{1}{2}$ inches in size. If a copper oil is used, this spray should be used as soon after the fruit has set as possible. Danger of copper injury will be increased as the fruit grows in size. Neither straight oil nor copper oil should be used when the fruit is between the sizes noted above as an injury called oil blotch is apt to occur.

Do not spray with oil unless soil moisture is adequate.

Parathion: — Some parathion sprays may be used for scale control during May. Certain factors concerning the use of parathion have come to our attention and it

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seems advisable at this time to issue specific warnings against certain of the hazards of handling parathion. Very complete directions concerning the use of parathion have been published with the Better Fruit Program in the Citrus Spray Schedule by the Florida Citrus Commission. As has been stated previously, these recommendations were designed to be strictly adhered to. We have received reports during the past 2 weeks of some illnesses from parathion. None have been severe, but they point up the fact that in some instances at least, all the precautions laid down have not been enforced. In some cases this is due to misinformation and in other cases it is due to carelessness. Growers should be particularly careful that their men wear masks at all times during parathion spray operations, that they wear natural rubber gloves, that they keep their sleeves rolled down, that they wear hats, and that they change clothes after each working day. In many cases greater care should be exercised by men mixing materials in the spray tank. Checks in the field have indicated that these precautions are not all being followed. We have a good insecticide, let's use it properly.

Rust Mites

In many cases post-bloom applications have gone on fairly early in 1950. It is to be expected that there will be a considerable interval of time between that sulphur application and the sprays for scale control in June and July. In all probability rust mites will become a problem in many of these groves during the month of May. It is suggested that growers be particularly careful in checking their groves during May so that rust mites do not cause early injury to fruit. A sulfur spray or dust will be satisfactory for control.

Purple Mites

Purple mites continue to be a problem in a few groves. Oil sprays will be the most satisfactory means for purple mite control during May. Where scale control is not desired at the same time, oil may be reduced to a 1% emulsion. Good coverage with this percentage will give satisfactory purple mite control. The precautions concerning the use of oil in the above paragraphs on scale control should be noted.

Grasshoppers

Hatch of the bird grasshopper had not commenced by the middle of April. It is to be expected that hatching will start in late April and in early May and continue throughout May. In those areas where grasshoppers have been a problem during the past several years, it is strongly recommended that clean cultivation practices be maintained up until about June 1. By clean cultivation the use of insecticides may be eliminated.

Mealybugs

May is the time to look for mealybug infestations. Mealybugs can build up in considerable numbers during this season of the year. For the first time we have a relatively satisfactory means of controlling them. Parathion applied at the rate of 2 lbs. of 15% of wettable material per 100 gallons of spray will give relatively satisfactory control even where mealybugs have reached the stage of getting under the buttons of the fruit. This spray applied for mealybug control in late May or early June will give relatively satisfactory scale control. However, it should not be expected that a May spray will necessarily carry the grove through the fall months without additional scaleicides being applied. The precautions concerning the use of parathion found in the section under scale should be rigidly adhered to.

For additional information consult the Citrus Experiment Stations at Fort Pierce or Lake Alfred.

Any Successful Business Must Have Experienced Direction

... And in this respect the production of citrus fruit is no different than any other business.

The old days when trees were left largely untended and uncared for is definitely a thing of the past . . . vast increases in production and the development of keen competition has made it essential that both quantity and quality crops be produced each year in order that the growers may profit.

No one production practice has had more to do with the development of bigger and finer crops than good fertilization . . . although the proper use of insecticides and other cultural practices have also played important parts in the improved fruit which Florida Growers now offer the consuming public.

In the vast citrus belt of Florida you will find successful growers who swear by the effectiveness of Florida Favorite Fertilizers, who will be glad to show you over their groves and probably will let you see the records of their fruit production and market returns.

Naturally we take pride in this situation and we also pride ourselves upon the fact that our customers receive their fertilizer from us in our own fleet of trucks when and where they want it.

Let Our Field Service Men Discuss
Your Production Problems With You

Florida  **Favorite**
FERTILIZER, INC.

Old Tampa Road

Lakeland, Florida



Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

The Quick Decline Disease ... Of Citrus

Quick decline, a serious disease of sweet orange on sour orange rootstock was first discovered in southern California in 1939 and is now believed to be closely related to or identical with similar disorders of citrus reported from the Union of South Africa, Gold Coast of West Africa, South America, Java and Australia.

In the late 1890's the citrus industry of South Africa began the use of sour orange as a rootstock and it was soon observed that sweet orange and mandarin trees budded on sour orange rootstock usually died within two or three years. Trees that survived longer were "sickly and dwarfed." With that experience, and with the knowledge that orange and mandarin grew satisfactorily on rough lemon, their propagation on sour orange was discontinued and rough lemon was used as a stock almost exclusively thereafter. At that time it was observed in South Africa that lemon trees on sour orange stock grew well and produced profitably.

In 1928 a disease similar to that in South Africa was noted in Java. The failure of sweet orange, tan-

J. M. WALLACE AND W. P. BITTERS
U. OF C. CITRUS EXPERIMENT
STATION, RIVERSIDE, CAL.

gerines and grapefruit on sour stock and the successful growth of certain other scion-stock combinations suggested that the disease in Java was the same or very similar to that known earlier in South Africa.

A similar disease was discovered in Argentina in about 1930 where it was known as "podredumbre de la raicilla" (rot of the rootlets). The disease was found in Brazil in about 1937 where it was given the name "tristeza," which in Portuguese means "melancholy" or "sadness." The same disease was observed in Uruguay in 1940.

Australian workers reported recently that a disease causing the decline of sweet orange and grapefruit on sour orange stock has been present in Victoria, Australia, since 1941, and it is known there as the "bud-union decline disease." From the published accounts it appears that the disease in Australia is probably the same as reported from other countries mentioned above.

Distribution of Quick Decline in California

At present, in the United States,

quick decline occurs only in California where it is now known for certainty in Los Angeles, San Bernardino, Orange and Riverside counties. There are three principal areas of heavy infection. The first and largest of these areas lies chiefly in Los Angeles County and extends roughly from the towns of Arcadia and Monrovia on the west to Etiwanda on the east in the belt of citrus lying between Pomona on the south and the mountains to the north. The second major area of infection lies in Orange County and includes roughly the area north and south between Brea and Santa Ana and east to west between Yorba Linda and Buena Park. The third area is smaller in size and lies slightly west of the other two areas and includes the Pico-Whittier district.

The number of trees infected to date cannot be determined. In Los Angeles County alone, orchard surveys by the State and County Departments of Agriculture showed an increase from 146 quick decline trees in 1940 to approximately a grand total of 200,000 diseased trees by 1949. It has been estimated that in the total citrus plantings of California there are approximately 13 million trees of combinations susceptible to quick decline.

Dr. J. M. Wallace is Plant Pathologist and Dr. W. P. Bitters is Assistant Horticulturist, University of California Experiment Station, Riverside, California.

By 1949 the disease had been found to be present at least to a slight extent in most of the citrus-growing areas of the four counties named above. Where quick decline is present in acreages outside of the three heavily infected areas mentioned above, diseased trees have been found to be few in number and are often widely separated. However, the somewhat slow but rather constant spread of the disease has made it necessary for the State Department of Agriculture to revise the original quarantine lines so that in a major portion of these counties the movement of susceptible citrus nursery stock or propagative material is now regulated.

Symptoms of Quick Decline

Trees showing symptoms of quick decline appear very similar, or identical, to trees that have been severely girdled by gophers. They also closely resemble trees in advanced stages of brown rot gummosis (foot rot), Armillaria and other root rots. In fact, any factor or environment that causes extensive root decay will induce a top condition that is similar to or sometimes indistinguishable from quick decline symptoms. Quick decline trees most commonly show a gradual top decline but some, particularly younger trees, frequently wilt quite suddenly. On such "collapse" trees the dried leaves and fruit, if present, remain for a considerable period of time. On trees that decline slowly the first sign of disease is a lack of new growth during a normal growth flush. At this time the mature leaves assume a dull ashen or slightly bronzed color. Later the foliage becomes more yellow and at times some of the leaves may show a chlorosis or yellowing along the veins. Many trees set a very heavy crop of fruit prior to the appearance of foliage symptoms. The fruit on such trees colors prematurely and a heavy crop of prematurely colored fruit is often the first indication that the tree will later decline.

Trees that develop the collapse type of symptom in some instances may die, but in other instances parts of these trees remain alive and later produce some new growth. In the slow decline type, the trees lose their leaves gradually. As the foliage becomes thinner the trees become subject to sunburning and may show considerable dieback of small limbs as well as

varying degrees of injury to exposed parts of the trees. The trees may lose nearly all leaves over a period of several weeks but in most instances they begin to produce new leaf growth before they become completely defoliated. When such affected trees begin to make new growth they are described as having reached an equilibrium or partial recovery stage. The degree of recovery made by these trees varies widely between individuals. In the case of some, the new growth is only sufficient to keep the tree, or a part of it, alive. In other instances a quick decline tree rebuilds a fairly normal top and produces some fruit. These recovered trees seldom produce sufficient fruit to warrant keeping them and it is known that they may collapse or decline again if subjected to adverse growing conditions, particularly insufficient soil moisture.

When very young trees become infected with quick decline they commonly set an excessively heavy crop of fruit at a much earlier age than healthy trees. Many young trees collapse quickly, but some of them, like most older trees, may develop symptoms slowly and then make a partial recovery.

Preceding any noticeable symptoms in the tops of the trees the stored starch in the roots disappears gradually and the roots decay progressively from the extremities. When trees begin to show foliage symptoms and for a period of time thereafter, starch is usually depleted in all or in parts of the root system. After quick decline trees reach the equilibrium stage some starch reappears in the root system but the supply of food reaching the roots is not sufficient for normal growth. It is now known that the top symptoms of quick decline result from the rotting of the roots. The root decay is actually a result of starvation. Microscopic study of bark of the rootstock taken at or near the bud-union of quick decline trees shows that the tissues through which food moves from the leaves to the roots are destroyed or so reduced that the required amount of food cannot reach the roots. A quick decline tree reacts much like trees that have been girdled by removing a ring of bark. When the supply of stored food is exhausted the roots cannot get sufficient food to maintain their life and growth

processes. Such roots then become subject to attack by numerous kinds of bacteria and fungi. When the root system is destroyed to the extent that it cannot supply the top of the tree with sufficient water, the above ground parts begin to suffer and the resultant symptoms follow.

The breakdown of the food conducting tissues at the bud union causes an accumulation of excessive food and other materials in the top and this undoubtedly is responsible for the early and heavy fruit production during the onset of the disease.

Nature of Quick Decline and Its Means of Spread

By the time quick decline made its appearance in southern California, many theories had been advanced to explain the failure of certain citrus varieties on sour orange stock in Africa, Java, and South America. These included scion-stock incompatibility, nutrient deficiencies or excesses, soil moisture relationships, nematodes, pethogenic organisms, soil acidity and viruses. Many of these and other theories were given consideration as the possible cause of quick decline by workers at the California Citrus Experiment Station when they began extensive quick decline investigations in 1944.

Transmission tests in which buds from quick decline trees were placed in healthy two-year old Valencia on sour trees in June 1945 gave evidence by the summer of 1946 that the disease was infectious and that it was caused by a virus. This has been fully substantiated in later tests.

The transmission of the disease by buds from discarded trees demonstrated that quick decline can be introduced into healthy plants by graft-union with diseased, or virus-bearing tissues. Experimental attempts to transmit the virus by inoculation of healthy plants with juice extracted from diseased tissues gave negative results and this suggested that natural spread from tree to tree is probably by means of insect carriers or vectors.

In late 1946, it was reported from Brazil that tristeza also is a virus disease and that it is transmitted by an aphid, *Aphis citricidus*, which has been reported to be found in Java, South Africa and West Africa but which has not been collected in the United States. A search for insect carriers of the

causal agent of quick decline was begun in California early in 1945 before it had been demonstrated that quick decline was caused by a virus. Surveys have disclosed insects of more than 245 species present in varying numbers in citrus groves. Controlled transmission tests have been made with many different species. Hundreds of tests have been made with insects from such groups as aphids, leafhoppers, and thrips. The aphid and leafhopper groups are most frequently involved in the transmission of plant viruses and it seems more likely that the vector of quick decline virus may be found among them. Trials are being made, however, with many other insects inasmuch as studies up to the present have not revealed the carrier of the virus. (See CITRUS LEAVES, volume 27, number 1, January 1947 and CALIFORNIA AGRICULTURE, volume 2, number 12, December 1948, for details of insect transmission studies.)

Susceptibility of Scion-Stock Combinations

In California citrus groves only sweet orange on sour orange rootstock has been observed with absolute certainty to be affected by quick decline. In several instances orange trees on rootstocks which, from chemical tests of the bark, appear to be grapefruit have been found with typical quick decline symptoms. Sweet orange on rootstocks of sweet orange, rough lemon, or trifoliate orange so far appear not to be injured even though such trees can be symptomless carriers of the virus.

Regardless of the rootstock on which they are growing, lemon trees have so far remained free of quick decline symptoms. There are relatively few grapefruit trees on sour rootstock in the quick decline areas, but in the few plantings studied no apparent affected trees have been found. After three years however, some of the experimentally inoculated grapefruit trees on sour orange rootstock are beginning to show symptoms suggestive of quick decline. In the countries where tristeza occurs, grapefruit on sour orange root is reported to develop symptoms much more slowly than sweet orange on sour root. No plantings of mandarins on sour orange have been available for study within the quick decline areas in California.

In order to determine the su-

sceptibility of commercial citrus scions on various rootstocks to quick decline, preliminary rootstock plantings were begun in Covina district. The plantings included fourteen different rootstocks and represented twenty-nine different combinations of stocks and scions. All of these trees were exposed to natural infection and the trees in one planting were also inoculated with diseased buds. As of 1949 only sweet orange tops on sour orange roots have developed symptoms of the disease.

Control Measures

Because of the nature of viruses causing diseases in plants, their control, except in rare instances and under special circumstances, must be chiefly a matter of prevention. In the case of quick decline the only certain control is that of the use of resistant scion-stock combinations. Such a control, of course, is of no value for 1945. The trials were conducted with various cooperators in the quick decline area of the Azusa-the susceptible combinations which now constitute a large part of the citrus plantings in California. Attempts to lessen the effects of the disease on affected trees have been made by the application of soil amendments and various fertilizers, and by injection of both the trees and the soil with various chemical disinfectants, vitamins, sulfa-compounds and the like, but results have been negative.

Inarching and Bridge Grafting

Inasmuch as quick decline attacks trees only on certain rootstocks, a possible treatment of susceptible combinations before or after they become infected seemed to be the process of "inarching," to change the trees over to a resistant root.

Inarching trials were established in 1945 in several groves of cooperators in the quick decline area. Trees of different ages without symptoms, or in varying stages of decline were inarched with either sweet orange or rough lemon seedlings. Results indicate that after 4 years some of the inarched trees show a definite improvement but that the degree of improvement is not sufficient to salvage the diseased trees. Additional study will be required to determine the success of inarching. At present it appears that the initial expense of the inarching plus the necessary extra care in watering

and pruning of inarched trees during the period of several years required to rebuild a new root system and a productive top is less satisfactory than the practice of replanting with trees on a resistant rootstock.

Attempts were made to "bridge" the bud union of affected trees by inserting grafts of rough lemon across the union. This procedure proved to be ineffective in protecting susceptible trees against quick decline.

Topworking

Trees showing varying stages of quick decline have been experimentally topworked to lemon, grapefruit, tangerine, tangelo and lime. At present it seems safe to conclude that quick decline trees, if not too severely affected, can be topworked satisfactorily to lemon. This is to be expected since lemons on sour orange rootstock have shown no injury from either quick decline in California or from tristeza in South America. It has been reported also from Brazil that the topworking of tristeza-affected orange trees to lemons is satisfactory. Results in California indicate that it is essential to eliminate the entire sweet orange top in the topworking operation. Therefore, it is advisable not to leave nurse limbs at the time of topworking, and all leaf growth that develops from the orange trunk and limbs should be instantly removed.

Rootstock Trials

Since the only certain control of quick decline involves the use of resistant stock-scion combinations, it is essential that new plantings be made with trees which will grow satisfactorily in the presence of the virus. Extensive rootstock screening tests are now under way to determine the degree of susceptibility of the various combinations. More than 175 types of citrus and citrus relatives are in various stages of being tested as rootstocks for oranges under quick decline conditions. The first planting of trees on 125 stocks was made in 1948. Some of the combinations are now expressing the first symptoms of quick decline conditions. The indications are that other stocks than sour orange are susceptible to the disease. More time is needed to confirm and extend these observations.

Some of the rootstocks under
(Continued on page 17)

Spreading Decline Hits Many Polk County Groves

A mysterious "spreading decline" which has been attacking Florida citrus trees for 20 years, but which has only become serious in recent years, is so acute in some Polk County groves that trees are being removed and burned by the thousands.

This reporter visited one Polk County grove in which more than 4000 trees are being destroyed. Although this represents only a small portion of the trees in this

BY LOYAL FRISBIE

disease and hope to "break the case" within a year.

"This problem is something like polio and cancer in medical science," Dr. Suit remarked. "We haven't quite been able to put our finger on the cause."

Use All Insecticides

The Polk County grower—who asked that his name not be used

cline appear to be undernourished, but extra fertilizing doesn't help.

Several 40-acre groves in the county have been wiped out, heavy infection has been reported near Howey-in-the-Hills, and the experiment station has a list of "about 60 or 70" groves throughout the state which are affected.

Dr. Suit estimated that about two-thirds of the listed groves are in Polk County. However, there is no assurance that all cases of



The only sure cure so far found for the spreading decline which has been attacking citrus trees for several years is pictured here, as scores of trees from a Polk county grove go up in smoke. An excavation-type claw drops another tree on the pile. The trees were pushed over by a bulldozer, then dragged to the pyre by a tractor. This is the grove from which more than 4000 trees are being removed. The clearing shown above, about 200 feet in diameter, is surrounded by healthy trees. The land will be reset with young trees in the next few months.

property, the loss of the trees is not the principal source of worry to the grower.

No one yet has found a cure for the infection, although the Lake Alfred Citrus Experiment Station has been working on the problem for the past five years.

Dr. R. F. Suit, of the experiment station, said cautiously that researchers believe they finally have a lead to the cause of the

because "I'd hate to have people saying my property is in such bad shape, when there's a lot of it scattered through the county"—said that every known insecticide spray has been used without success.

Dr. Suit added that although dry weather apparently has some effect on spreading the decline, extra irrigation won't produce a cure. Trees stricken by the de-

the infection have been reported.

The trees don't die completely, but shrink back to a state of development insufficient to produce fruit. There is no predicting where it will break out. It will appear in a tree one year, and will spread to a few other trees each season. But within the same grove, there may be scattered areas of infection, with healthy trees in between.

(Continued on page 18)



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Notes Of The Trade



John T. Lesley (left) Haines City, manager of the Haines City Citrus Growers Association, and B. A. Weathers, Jr., Orlando, Florida, representative of the Fourdrinier Kraft Board Institute, examine a box of Valencia oranges packed in the new Kraft corrugated board box just announced. Lesley's firm is the first commercial user of the new box developed by the Fourdrinier Kraft Board Institute.

In the Haines City installation,

after packing by hand, handling of the new boxes is done by automatic machinery which seals the top and bottom of the box and delivers it to the railroad car. The box being examined, has been opened for this inspection.

The new box holds one half the quantity of the conventional Bruce box, and requires no refrigeration, yet preserves the quality and freshness of the fruit, according to Institute spokesmen.

NEW PARATHION PLANT IN TAMPA

Parathion, the Cinderella of the insecticide field, is making a strong bid for favor among the Florida growers—comparing favorably with oil sprays. The popularity of this new phosphate compound is reflected in the recent heavy shipments of Parathion to this state and particularly in the opening of a new Parathion-producing plant at the Flag Sulphur and Chemical Company at Tampa, Florida. This plant will be operating at full capacity about the time of the publication of this article, according to W. Mercer Rowe, Vice-President of the Flag Company. Up to this time, his company had specialized in the production of agricultural sulphures and other chemicals.

Mr. Rowe pointed out that the latest equipment developed for the production of Parathion has been installed and that this new Tampa plant will be geared to a con-

tinuous operation. It will be capable of handling an adequate supply for practically the entire state. This modern equipment includes a special suction installation for the safety of operators in their handling of the potent chemical. A steady flow of 200 cubic feet of air per minute is constantly drawing off dust and fumes at all times at the plant, even when the machinery is not actually in use.

The Flag Sulphur and Chemical Company has ample storage facilities for both the raw materials and a generous supply of accurately metered, packaged Parathion for immediate delivery according to Mr. Rowe. The plant is strategically located for convenient shipment by truck or rail and is in excellent position to keep up with even heaviest demands.

WOODS RETIRES AS PRESIDENT

Election of J. Albert Woods, president of Wilson & Toomer

Fertilizer Company, Jacksonville, to the presidency of Commercial Solvents Corporation, New York, was announced on April 13 by Major Theodore P. Walker, chairman of the board of the Solvents Corporation.

At the same time, Woods announced his resignation as head of the Jacksonville fertilizer firm but said he would continue to serve as a director. His resignation will become effective July 1. A successor has not been named.

Commercial Solvents Corporation is one of the nation's largest manufacturers of pharmaceuticals and agricultural and industrial chemicals.

Wilson & Toomer's subsidiary companies, the Florida Agricultural Supply Company and the Southern States Bag Company, manufacture a complete line of insecticides, burlap and cotton bags. The company's plants and warehouses are situated in many sections of Florida.

Commercial Solvents Corporation operates plants in Agnew, Cal.; Carlstadt, N. J.; Harvey, La.; Newark, N. J.; Sterlington, La.; Terre Haute, Ind.; and Peoria, Ill. Branch offices are situated in Baltimore, Boston, Chicago, Cincinnati, Cleveland, Detroit and Kansas City.

A. P. Spencer, former director of the University of Florida Agricultural Extension Service, now retired, has been named in the monthly supplement current biographical references service, an adjunct of Who's Who in America. Mr. Spencer retired June 30, 1947, after 38 years with the University of Florida.

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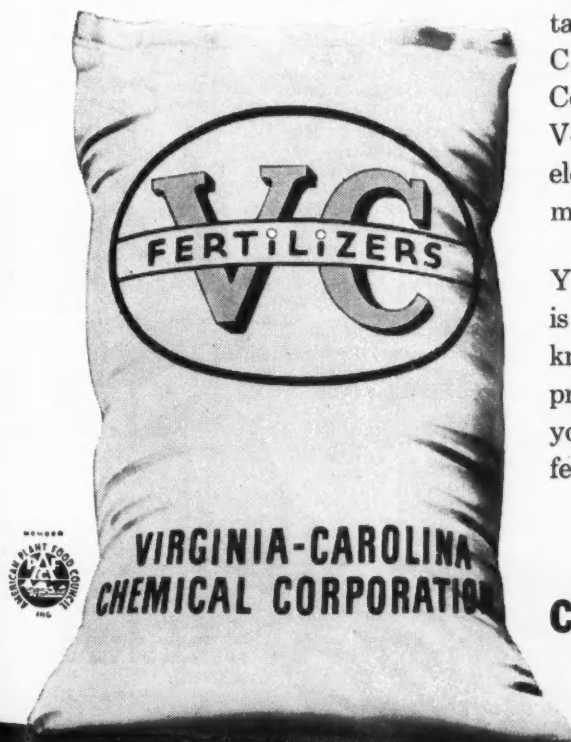
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V-C FERTILIZERS MAKE THE GOOD EARTH BETTER

Field Observations Of The Manatee Snail

FRED P. LAWRENCE,
CITRICULTURIST, AT BROOKSVILLE
CITRUS INSTITUTE, APR. 28, 1950

When I first went to work for the Extension Service I was very much interested in cover crops and I still am so whenever I was given an opportunity to speak I preached cover crops. Often I would work on my speeches at home and finally my wife said to me, "If you don't talk about something besides cover crops, people are going to refer to you as old cover crop Lawrence." This was a rather startling suggestion but I do believe she had something for now the boys never give me a choice of subject, they always write and tell me what I can speak on—and how long. So you see, I wasn't too surprised when I received a letter from Harry last week asking that I be on his institute program and also stating that my topic would be "Field Observations of the Manatee Snail." Well, I didn't mind that for I'm interested in the snail too. And I don't believe I'm as far off as the school boy was when his teacher asked him to name the sexes—His reply was, the male sex, the female sex and insects—Now I know you citrus growers are not especially interested in the first two sexes but certainly insects are a prime concern to you. The snail cannot be classed as an insect but to some growers, it is vital in their insect control problems.

In telling you my field observations on the work being done with the snail, I feel that I must bow in the direction of Bob Norris for he has spent many years working with and observing the citrus tree snail. In fact, it is sometimes referred to as the Bob Norris snail. Bob doesn't claim to be an authority on this snail which is known scientifically as *Dyameus dormani* Bienny, but I have heard him say many times, "You know I never see a snail grove without being impressed." In fact, it was just such a statement that caught my interest and the more groves I saw and the more growers I talked with who had them, the more interested I became.

These snails are credited by

many Florida citrus growers with protecting fruit, foliage and branches of the citrus tree from the damaging effect of white flies, sooty-mold and scale insects. Recently I talked with Mr. Cohen Bray of Winter Garden who stated that snails had been in his Lake

Apopka grove for over 25 years. He stated that he never sprays but that fruit buyers always come to him and pay a premium for his fruit when ever they want a special order of bright fruit. Mr. Ed Register, Production Manager for R. Parks Williams, stated that



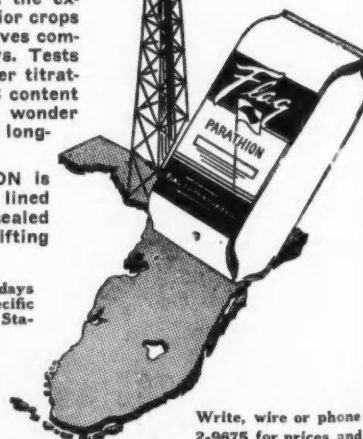
● **BAD NEWS** for Citrus Scale, Mealy Bugs and the many Mites . . . **FLAG** is producing Parathion in Florida! Good news, indeed, for Florida growers who can now get immediate shipments of Parathion from this new, modern Tampa plant.

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* Parathion not to be applied within 30 days of Harvest. For correct timing on specific varieties consult Citrus Experimental Station.

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they never use anything in the way of sprays anymore. They dust with sulphur as the need arises, some years none, some years one or two and usually never over three applications per year. They have found the snail so effective in insect control that they are transplanting them into all of their groves. I know of another grower who thinks so much of his snails that when the picking crews go into his groves, he hires a group of negro children to pick the snails off of the boxes and put them back in his grove.

I could go on with these stories indefinitely for I have never talked with a grower who had snails in his grove who was not very pleased with them and considered them an asset.

On the other hand, it seems that snails will not become established in every citrus grove. Bob and I have been working on this for three years and we are relatively sure this is true. We know that the snail seems to have an affinity for Hammock groves. This has led us to our humidity theory. We have seen them become established on groves that were on deep phase sand and migrate up over the high sand hills but in every case these groves grew rank cover crops which I believe helped to maintain a comparatively high humidity. There, I knew I'd get a plug in for cover crops.

Secondly, snails will not do well in groves that are sprayed. They will survive sulfur dusts but that's about all. This being the case I can well imagine some groves in which nutritional sprays would be of far more value than the snail. And thirdly, no scientific data has been obtained that would definitely prove or disprove the economic value of the snail.

Its history reaches far back into the annals of the Florida Citrus Industry. Shortly after the Civil War, a Major O. J. Dorman of St. Augustine found it on wild orange trees in the St. Johns swamp. Its discovery created little interest among citrus growers until the citrus white fly became a pest and Florida growers were forced to wash their fruit before shipping it.

Then it was discovered that those groves growing along the Manatee river which were inhabited by snails always looked

(Continued on page 16)



There's good reason why more and more Florida growers are using Swift's Red Steer for Citrus!

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Is your grove showing the proper growth? Are your trees producing the boxes of quality fruit they should? We maintain a staff of well trained men who will be very glad to inspect your grove and give you a complete report of their findings and what should be done to get maximum fruit production. There is no obligation for this service. Drop us a card or phone us and we will have one of our men contact you. Keep down production costs by getting the maximum number of boxes per tree.

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Reports Of Our Field Men . . .

SOUTH POLK, HARDEE AND HIGHLANDS COUNTIES

R. L. (Bob) Padgett

The showers around the first of the month gave temporary relief to irrigators. Growers have been given a chance to spray these last two weeks since the rain.

Many of the growers in this area have been concerned about the common grapefruit bloom. I have found that the common grapefruit bloom has been light until just lately. However, we are beginning to see plenty of common bloom. The pineapple oranges have been the lightest bloomer in this area.

The recent cold weather made another killing blow in the Lake Istokopoga area — the beans were a total loss. The vegetable harvest in Hardee County is holding out as predicted a long time back. The cucumber crop is light and the quality isn't up to par this year.

Many growers are beginning to think about this summer fertilizer application. I believe this territory will see more quality fertilizer and a better secondary mixture used this summer than in several years.

POLK COUNTY

J. M. (Jim) Sample

While much of the county enjoyed beneficial rains during early April, some sections were missed and irrigation has continued and probably will keep on until the rainy season begins. High winds have dried out the soil and evaporation has practically offset the showers. There is much comment among growers and various field men that the new set of fruit is spotted and light, particularly on seeded grapefruit and early oranges. The general observation is that the trees bloomed adequately only in the top half, while the lower half did not bloom heavily and the set is light. This condition seems to prevail where the trees bloomed during January, February and March. The trees that bloomed in April, following showers, have adequate bloom and young fruit. Most Valencia crops are picking short of the estimate, and, in some cases, from 10 to 20 percent less than the volume last season. Purple scale is building up rapidly and many growers are using Parathion. Summer fertilization has started and it is planned earlier so as to avoid heavy leaching by Summer rains.

WEST CENTRAL FLORIDA

E. A. (Mac) McCartney

The unusually cold weather in past weeks has retarded the bloom on citrus where it was late in some of the Valencia groves. It is almost always hard to determine about the grapefruit bloom, but we generally get a crop after there appears to be very little bloom.

Vegetables seem to have come through with very little damage. It is too early at this date to report on watermelons as I am just leaving to cover my territory.

Most citrus growers have taken good care of their groves this Spring. Prices are still good despite all the talk about the possibility of a drop. Late bloom fruit is still not passing the maturity test in my section. There are some instances of the seed in the fruit sprouting, but still it won't pass.

Friends of Mr. Rickborn will be glad to know that he left the hospital last week and is now at his home in Lakeland, making a fine recovery.

NORTH CENTRAL FLORIDA

V. E. (Val) Bourland

The recent cool weather has been harmful to truck farmers in this section. Cucumbers which were grown under boards were damaged considerably, and the replanted ones are still not looking good because of the cool winds. Sweet corn around Zellwood was almost a total loss, and growers are still busy replanting. The winds have also injured what few melons were left and the replanted melons are having a hard struggle.

Groves are looking very good and are continuing to bloom. Lots of spraying is being done and many growers are planting cover crops. Most growers have put on top dresser or nitrogen in some form.

SOUTHWEST FLORIDA

Eaves Allison

There is a very heavy new citrus bloom in this area, both on trees which have already had one or two blooms and on those which have had none. This is true on grapefruit as well as oranges.

Heavy rains, cold winds and just plain gale winds have played havoc with early cukes and melons and have been very hard on tomato crops. There was even one case

of hail damage at Imokalee. Relatively few cukes have been picked so far and early watermelons were wiped out. Most melon growers are going ahead with their third planting and the vines at this time have a spread about the size of a cow-boy's hat when they should normally be covering the middles.

Valencias which now remain on the trees are of fine quality although smothered now with new growth, young fruit and heavy bloom.

HILLSBOROUGH & PINELLAS COUNTIES

C. S. (Charlie) Little

Groves in this section are in very good shape, and although there is still a little moisture left most growers are preparing to start irrigating soon unless adequate rainfall should come soon.

Most groves in this area were slow in blooming, but where the bloom did come out it was the heaviest in many years. Of course this sort of bloom does not always indicate a heavy crop of fruit.

Valencias have started to go backwards at this writing. Some of them have begun to coarsen, turn green and also dry out at the stem end. We still have plenty of Valencias and grapefruit in this section which has not been picked.

Rust mite and red spider are still prevalent and should be kept under control. We also have a heavy infestation of scale which should be controlled as soon as possible.

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FIELD OBSERVATIONS OF THE MANATEE SNAIL

(Continued from page 13)

vigorous and the fruit never had to be washed. This created considerable interest in the creature and in 1906 E. H. Sellards of The Florida Agricultural Experiment Station published Press Bulletin No. 59 entitled "The Manatee Snail." In this bulletin Mr. Sellards made the following statement in speaking of sooty-mold: "The fungus develops on the fruit as well as on the leaves and stems, and washing becomes necessary, resulting not only in added expense, but also in increased danger of decay in shipping." "Such trees in these groves which are well stocked with the snails have been thoroughly cleaned, the fruit not requiring washing." Those statements are pretty well true today, so we wonder why the snail seemed to gradually disappear and sooty-mold remained.

We know now that the snail all but disappeared because Florida growers learned to use sprays. It wasn't so long ago growers became conscious of melanose and

other fungus diseases, so they used their best and most effective fungicide—Bordeaux. We now know that copper sprays as well as many other sprays will kill the snail and that is one of the reasons they almost disappeared. No doubt there are other things that also had a limiting effect, such as humidity and temperature.

We have been able to make the following observations on the life history of these snails: They are hemophoriditic and they lay their eggs in the sand and leaf mold at the base of the trees during the summer rainy season. Usually the greatest mass of eggs are found during the month of July; however, we have found them from June to August. The eggs are about the size of and look very much like tapioca. They hatch in a very few days and the young snails proceed up the trunk of the tree immediately following a shower. Moisture is a requisite to finding these egg masses. We have never found them under dry conditions. In fact, the migration of the young snails up the tree seems to cease as quickly as the tree trunk dries

off. The snail population steadily increases from June until it reaches its peak in October and November. It is at this time that some form of protection should be provided for them during cold weather. It appears that under normal conditions the snail goes into hibernation in early December and remains there until the cold weather passes.

We have conducted several tests in an attempt to find practical ways to help snails through unfavorable weather conditions. For when weather conditions are unfavorable either because of drouth or cold they seek shelter. If they find it, many are carried over and will do an effective job in the early spring or as soon as weather conditions are again favorable. If they do not find shelter most of them die. When the snail gets ready to hibernate they seal themselves into their shells with a fluid that later dries into a semi-transparent membrane. This membrane seems to have at least two functions. First, it not only seals the snail in its shell, it also cements the snail to the object he

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has chosen for hibernation. Secondly, it apparently provides the snail's first meal when it emerges upon the return of good weather. If this seal is broken during hibernation, the snail usually dies. For these reasons we feel some form of shelter should be provided during this period. Old fertilizer bags, particularly the paper ones when placed in the tree crotches, offers this protection in a limited way at least and they also serve as an excellent means for collecting colonies to be planted in new groves.

The snails are active only when the leaves and fruit are wet with rain or dew and during the summer and fall. As soon as the trees dry from dew or rain, they cease working, find a protected place, such as a curled leaf, and pull themselves into their shells. They become active again at night and after a shower.

So, the picture that we have been able to draw that we can present seems to indicate that the snails are effective under certain conditions but from what we know of it today, I do not feel justified in advising growers to plunge into the snail business. On the other hand, if they become established I feel they will be of some economic value to the grower.

THE QUICK DECLINE DISEASE ... OF CITRUS

(Continued from page 7)

test for their reaction to quick decline have already been evaluated from a horticultural aspect as to their worth as rootstocks in certain citrus-producing areas in California. However, numerous others, if they prove to be resistant to quick decline, will have to undergo a rather prolonged test in order to determine their value from the standpoint of their effects on yields, fruit quality and other characteristics of the orange top.

The threat of spread of quick decline to the presently unaffected citrus areas of California makes it unwise to plant oranges on susceptible rootstocks or even rootstocks whose reaction to quick decline has not been determined. On the basis of preliminary rootstock trials and field observations in California it seems safe at this time to conclude that orange trees grown on sweet orange, rough lemon or trifoliate orange roots are resistant to quick decline. Up to the present, lemons are ap-

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parently resistant to quick decline regardless of the rootstock on which they are grown. Young trees of grapefruit on sweet orange roots inoculated with quick decline in 1945 have grown normally. Grapefruit trees on sour orange root have developed quick decline symptoms much slower than trees of sweet orange on sour orange root but are now established as being susceptible. The extensive rootstock trials now under investigation in southern California will in the near future furnish additional information on the reactions of various rootstocks to quick decline.

SPREADING DECLINE HITS MANY POLK COUNTY GROVES (Continued from page 8)

At the grove visited by me, a circle about 200 feet in diameter had been cleared, but healthy, bearing trees completely surround the clearing.

Pushed Over, Burned

Trees are pushed over with bulldozers, dragged to a central spot by tractor, piled up by an excavation-type claw, and burned.

Within the next few months, the cleared areas will be set with young trees. In areas similarly cleared and replanted two years ago, the new trees are thriving, with no indication of infection.

Dr. Suit estimated that if all Polk County's infected trees were in one plot, they would cover between 300 and 400 acres—not much when compared to Polk's total citrus acreage, but definitely dangerous to the industry unless a cure is found.

He said the first instance of the disease was reported in 1930, but only became serious in 1945.

Dr. Suit said the experiment station hasn't publicized the struggle against the decline, not wanting to cause unnecessary alarm, and hopeful that a positive cure could be announced soon.

Meanwhile, according to the grower whose property was visited the decline has been known to attack trees budded on several different types of root stock.

There are three million home makers in home demonstration clubs in the United States . . . And there are home demonstration clubs in 56,000 United States communities.

Always face a ladder when going up or down.

GULF CITRUS GROWERS INSTITUTE

As this issue of The Citrus Industry goes to press, the Gulf Citrus Growers Institute is in progress at Brooksville, with many leaders in every phase of the industry scheduled for important papers covering every topic from grove care to placement of the fruit in the hands of the ultimate consumer. Many of these papers will appear in a later issue of this magazine.

Good Advice From Texas...

The following from Dan Sanborn's Rio Grande Valley News-Letter is worthy of serious consideration. With Florida measuring citrus by the box and Texas by the ton, the result is most confusing. Both states should be on the same measuring rule. Naturally, being a Floridian, we favor the box unit of measure, and Sanborn seems to agree that Texas should come to the Florida basis. Here is what he says:

"When I tell you that prices to growers of Florida oranges have dropped 75c a box recently, it might be confusing because you reckon grower prices on citrus in terms of tons, which is the way we figure them here in Texas. I'm suggesting to United Citrus Growers that they get the ball a'rolling to have our Valley Citrus prices reckoned on a per-field-box basis, like they do over in Florida (90 lbs. on oranges and 80 lbs. on grapefruit) . . . Right now, unless you've got a slide-rule, it's difficult for you to figure what the Florida growers are getting for their fruit, and it's just as hard for them to arrive at what our Valley growers are being paid . . . But to get back to the recent drop in grower prices on

Florida oranges, press dispatches coming out of Lakeland (headquarters for both Florida Citrus Commission & Florida Citrus Mutual) indicate that Valencias have dropped from \$3.50 per box to the growers to \$2.75. Florida's price is delivered to the concentrate plant (allow 35c a box to harvest & haul). According to my arithmetic system, this means that their on-tree grower prices has dropped from around \$70 a ton to roughly \$53, which is quite a drop, but which is still a pretty fair price, nevertheless . . . Us and Florida ought to be on the same basis, either by the ton or by the box, and as it isn't likely they will switch to our per-ton basis, then we ought to get on their per-field-box basis."

BECKENBACH ASSO. DIRECTOR U. OF F. EXPERIMENT STATION

Dr. Joseph Riley Beckenbach, for the past 11 years horticulturist in charge of the Vegetable Crops Laboratory at Bradenton, has become associate director of the University of Florida Agricultural Experiment Station.

His appointment, recommended by Director Wm. M. Fifield and approved by Provost J. Wayne Reitz and President J. Hillis Miller, has been approved also by the State Board of Control. Dr. Beckenbach began his new duties May 1.

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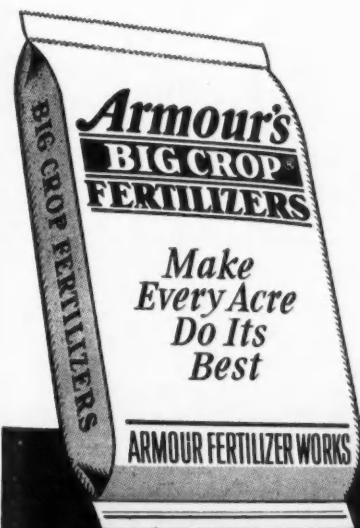


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